

## Structure of a Universal Multifunctional Digital Card in the Interest of the Armed Forces of the Republic of Uzbekistan in the Border Area

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**Abstract:** Currently, in digital form, there are topographic and special maps of various scales for most of the territory of the Republic of Uzbekistan, which are morally and technically outdated and does not meet the modern requirements of troops and weapons systems.

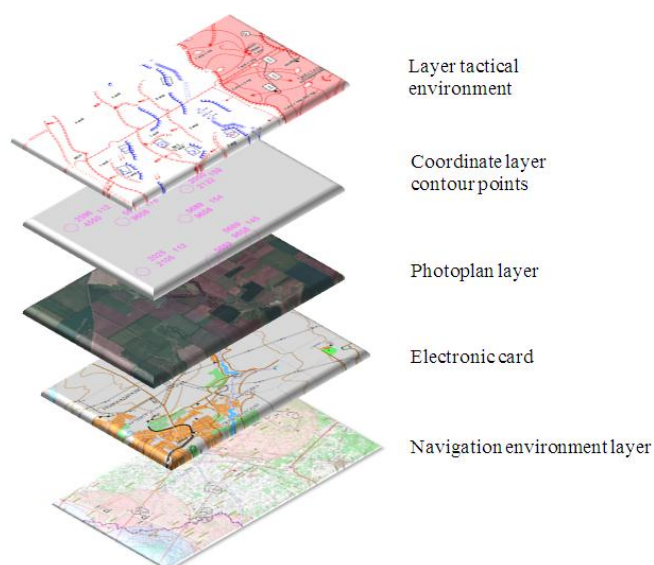
**Keywords:** universal multifunctional digital map, electronic map, basic mapping, topo geodetic and navigation support, military geoinformation system.

### Introduction

The correct use and removal of information from special maps in the Military Geographic Information System (MGIS) should significantly facilitate decision-making, reduce the time for organizing technical and engineering measures in the preparation and conduct of hostilities, reduce the cost of material resources for organizing the transportation of equipment, personnel, and property, and, ultimately, reduce possible losses in direct contact with the enemy. In modern conditions, troops need information for topographic and geodetic binding of elements of battle formations with greater accuracy than an analog topographic map can provide us.

In order to solve these shortcomings, it is necessary to combine various types of cartographic and special information, which is possible using a universal multifunctional digital card (UMDC).

The basis for creating a modern universal multifunctional digital map can be a scanned and a digitized analog map created by techniques using data from a digitized analog special map. This special map's main sources of error are errors introduced during scanning, transformation, and digitization. The proposed structure of the UMDC is shown in Figure 1.



**Fig.1. The structure of the universal multifunctional digital card**

The use of electronic topographic maps as the basis for a universal multifunctional digital map, created in compliance with all the requirements for topographic maps, as well as satellite methods for determining the coordinates of contour points, will improve the accuracy of work on topographic and geodetic binding of elements of battle formations of a formation.

### **Research Methodology**

It is necessary to use an electronic topographic map, as well as an array of initial digital information presented in the catalogs of points of the State geodetic network (SGN), Special Geodetic Network (SGN), lists of coordinates of contour points of the area. It is also advisable to use a digital photo plan or a transformed aerial photograph of the area to improve the visibility of topographic and geodetic reference and ease of orientation, as well as information about the navigation situation.

The use of methods and technologies of space geodesy and satellite navigation (GLONASS SNS) allows you to quickly determine the coordinates of weapons with higher accuracy compared to the accuracy of their determination on traditional topographic and special geodetic data maps (15 m).

Using the MGIS, it is possible not only to produce a modern map using the results of geodetic work on the territory of the upcoming hostilities carried out in peacetime, but also to introduce a layer with a photographic image of the terrain of these areas into the universal multifunctional digital map and navigation environment for more visual orientation when linking battle formations and a layer with a constantly changing tactical situation in the area of responsibility of the formation for organizing command and control of units. This will improve the reliability of topographic and geodetic and navigational connectivity and reduce the time required to perform the binding of battle formations.

### **Discussions of the analysis results.**

Creation of a universal multifunctional digital map with the proposed structure will achieve the following:

increasing the level of combat effectiveness of the use of systems (complexes) of weapons of the formation by increasing the accuracy of topographic and geodetic reference and reducing the time required for topographic and geodetic reference;

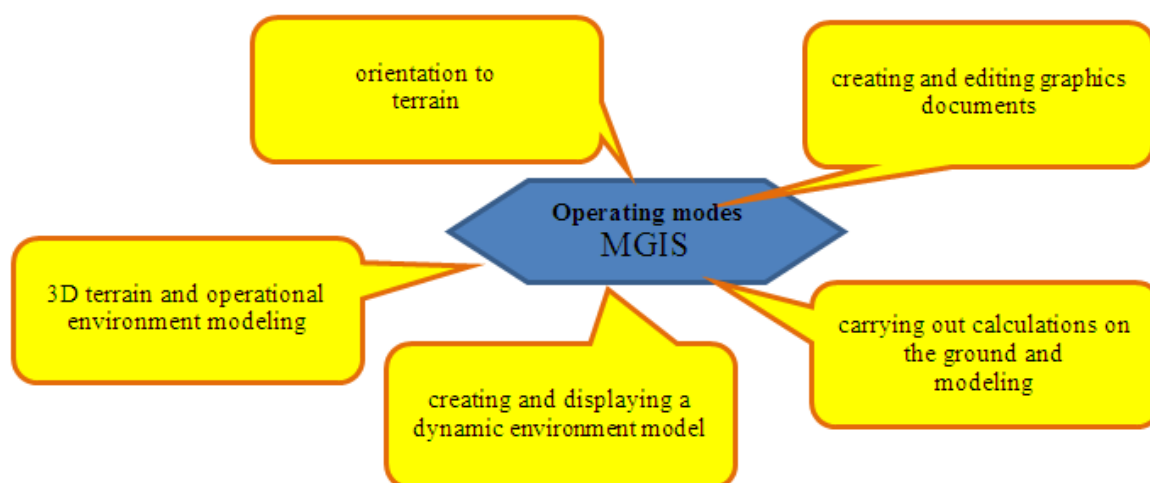
increasing the reliability of topographic and geodetic and navigational support of military operations of the formation through the creation and distribution of databases, including electronic topographic maps for the area of responsibility and data on the binding of contour points of the terrain, taking into account navigation data;

increasing the speed of data processing in the Military Geoinformation System of the Armed Forces of the Republic of Uzbekistan by reducing the time to bring information and the use of modern electronic computers.

Tasks solved with the help of means of geoinformation support of the territory of the Republic of Uzbekistan.

1. Development in electronic form of graphic documents of military administration;
2. Carrying out applied calculations and modeling the influence of the terrain on the conduct of military operations in a specific territory;
3. Orientation on the ground using consumer navigation equipment, which is integrated with a military geographic information system;
4. Monitoring of the situation using means of navigation software and displaying the situation with conventional signs on an electronic map - creating a dynamic model of the situation.
5. 3D terrain and operational environment modeling.

To solve each of these tasks, specific information and software tools are needed, therefore, it can be said that for each task, a special mode must be implemented using the software of the Geographic Information System for military purposes (Fig. 2).



**Fig.2. Operating modes of MGIS**

Operating modes of MGIS:

maintain a library of electronic conventional symbols of the operational environment that corresponds to the approved current Classifier of electronic conventional symbols of the operational environment (CEUCS OE);

support collective editing in real time of the same spatial data, including remote ones, by several users through communication channels with low bandwidth and communication interruptions in the conditions of the use of electronic warfare. When the connection is restored, the Military Geographic Information System should automatically update the data representation at the client workplace (perform spatial data replication);

provide for adding documents of other applications to the map (texts, tables, photos, map inserts), linking documents to maps and individual objects, storing documents on external SGN servers to provide collective access for viewing, editing and backup;

to improve software tools for displaying Geographic information systems on public screens and for printing (taking into account the tactical and technical characteristics of modern display and documentation tools);

increase the flexibility of customizing the appearance of conventional signs by editing semantic data;

develop tools for creating and applying templates and groups of symbols.



**Fig.3. General scheme of interaction with the SGN server**

## Conclusions

Today it is difficult to overestimate the importance of SGN technologies in the field of defense. The use of the Geographic Information System for military purposes in the interests of the Armed Forces of the Republic of Uzbekistan, allows you to reduce the likelihood of errors and shortcomings, increase the speed of calculations, speed up the processing of information and improve the quality of decision-making by management.

The analysis of Geoinformation systems for military purposes used in the military command and control bodies of the Armed Forces of the Republic of Uzbekistan allows us to draw the following conclusions:

1. Adopted in the Armed Forces of the Republic of Uzbekistan for the supply of the Geographic Information System for military purposes "Operator". Despite various complaints from management and operators, it is used throughout the troops.
2. Geographic Information System for military purposes "Operator" used in the military command and control bodies of the Armed Forces of the Republic of Uzbekistan is the most modern sample of the software of the Geographic Information System for military purposes with functionality, to the greatest extent corresponding to the tactical and technical requirements of the Armed Forces.

It allows solving a wide range of problems of analyzing and assessing the situation, but is of little use for solving a number of necessary tasks for the head of the topographic service of a formation, and does not allow using the Digital information of localities (DIL) quickly with the required quality, both in training and during military operations.

1. Improving the methods of conducting combat operations, the emergence of new weapons and military equipment, the development of automated command and control systems (ACCS) and SGN technologies show the feasibility of developing and improving the composition of applied tasks of the Geographic Information System for military purposes, in order to bring its capabilities in line with the tasks being solved head of the topographic service, during the preparation and during the hostilities.
2. An analysis of the features of the cartographic and geoinformation support of the territory of the Republic of Uzbekistan in the border area showed the need for the integrated use of various types of geospatial information in the conditions of modeling military operations in mountainous areas, which leads to the use of a universal multifunctional digital map as an optimal means of information about the area.
3. For the purpose of cartographic and geoinformation support of the territory of the Republic of Uzbekistan in the border area, the structure of a universal multifunctional digital map to the border area of Uzbekistan using GIS technologies is proposed.

## References

1. Langeman I. P. Geodezicheskoe obespechenie geoinformatsionnix sistem voennogo naznacheniya [Geodetic support of military geoinformation systems], inv. № 7778, VUNS SV «OVA VS RF».
2. Langeman I.P. Otobrajenie marshruta peremesheniya podviynogo ob'ekta na elektronnoy karte [Displaying the route of movement of a moving object on an electronic map] / Langeman I.P. // Nauchno-texnicheskii sbornik. – M.: OVTI 29 NII MO RF, 2008. - №12.
3. Males K.V., Langeman I.P. Problema sozdaniya avtomatizirovannoy mobilnoy astronomo-navigatsionnoy sistemi opredeleniya ukloneniya otvesnix liniy s primeneniem metodov i tekhnologiy GLONASS/GPS i astronomii [The problem of creating an automated mobile astronomical navigation system for determining the deviations of plumb lines using the methods and technologies of GLONASS/GPS and astronomy]. – M.: VUNS SV, NTS № 60, 2012.

4. Nastavlenie po obespecheniyu voennix deystviy Voorujennix Sil Rossiyskoy Federatsii [Manual on ensuring military operations of the Armed Forces of the Russian Federation] (topogeodezicheskoe i navigatsionnoe obespechenie), 2014.
5. Rukovodstvo polzovatelya Geoinformatsionnoy sistemi «Panorama» [User Manual of Geographic Information System “Panorama”]. – M.: Panorama, 2013. Ofitsialniy sayt <http://www.gisinfo.ru>.
6. Opisanie primeneniya Geoinformatsionnoy sistemi voennogo naznacheniya «Operator» [Description of the application of the Geographic Information System for military purposes "Operator"]. – M.: Panorama, 2012. Ofitsialniy sayt <http://www.gisinfo.ru>.
7. Topogeodezicheskoe obespechenie operatsiy [Topographic and geodetic support of operations],  
uchebnoe posobie,  
M.: VUNS SV «OVA VS RF», 2008.